

CLAIMS

1. A method for identification and registration of a moving object (V, VM), entering a pre-determined area (A) to be monitored, said identification operation comprising interaction between said moving object and an area access system (AM) associated to said predetermined area (A) and comprising supplying identification information (VID, TCC_ID, TAT), said registration operation being carried out over a wireless communication link (LT) to a control center (CC),

characterized in that includes the steps of:

- identifying said moving object (V) through a mutual interaction between said moving object (V, VM) and the area access system (AM), said mutual interaction being performed over a wireless short range communication link (BT); and

- performing said registration operation by establishing (GP) a wireless communication link (LT) of the long-range type between said moving object (V, VM) and said control center (CC), upon activation of said mutual interaction on the wireless short range communication link (BT).

2. The method of claim 1, characterized in that said supplying identification information (VID, TCC_ID, TAT) comprises the step of sending control center address information (TCC_ID, TAT) to the moving object (V, VM).

3. The method of claim 2, characterized in that said supplying identification information (VID, TCC_ID, TAT) comprises sending moving object information (VID).

4. The method of claim 2, characterized in that said identification operation includes the steps of:

- sending an identification request message (M1) from the area access system (AM) to the moving object

(V, VM), said identification request message (M1) comprising said control center address information (TCC_ID, TAT);

5 - sending an identification response message (M2) from the moving object (V, VM) to the area access system (AM), said identification response message (M2) comprising said moving object information (VID).

5. The method of claim 4, characterized in that said registration operation includes the steps of:

10 - sending a registration request message (M4) from the moving object (V, VM) to the control center (CC), said registration request message (M4) comprising said moving object information (VID);

15 - sending a registration response message (M5) from the control center(CC) to the moving object (V, VM), said registration response message comprising an acceptance information (access_denied_flag).

6. The method of claim 1, characterized in that it includes the step of providing and managing (110, 120, 20 130, 140) a vehicle status parameter (VAF) at the moving object (V, VM), which value indicates the moving object (V, VM) position with respect to said predetermined area (A) to be monitored.

7. The method of claim 1, characterized in that 25 after said identification operation the area access system (AM) sends a moving object parameters message (M3), comprising at least part of said identification information (VID, TCC_ID, TAT), to the control center (CC).

30 8. The method of claim 5, characterized in that said registration request message (M4) further comprises a moving object phone number.

9. The method of claim 5, characterized in that 35 said registration response message (M5) further comprises a control center phone number and/or map

information and/or prognostic feature data.

10. The method of claim 1, characterized in that it comprises exchanging further information messages (M6) between a driver (D) of the moving object (V, VM) 5 and the moving object (V, VM) itself.

11. The method of claim 1, characterized in that it further comprises a de-registration operation, that includes the steps of:

10 - detecting the exit of the moving object from the predetermined area to be monitored through a further mutual interaction between said moving object (V, VM) and the area access system (AM), said mutual interaction being performed over a wireless short range communication link (BT);

15 - upon activation of said detection operation, performing said de-registration operation by said moving object (V, VM) on said long-range communication link (LT) with said control center (CC);

20 - terminating (GP1) said long-range communication link (LT).

12. The method of claim 1, characterized in that in said registration operation said long range wireless communication link (LT) is at least partly carried out via a wireless mobile network (MN).

25 13. The method of claim 1, characterized in that it comprises performing an intermediate notification operation of the passage of the moving object (V) at an intermediate barrier within said area (A), upon activation of a further interaction on the wireless 30 short range communication link (BT).

14. The method of claim 13, characterized in that a notice of said intermediate notification operation is transmitted to said control center (CC) by said wireless communication link (LT) of the long-range type 35 between said moving object (V, VM) and said control

center (CC).

15. A system for identification and registration of a moving object (V, VM) entering a pre-determined area (A) to be monitored, wherein said moving object 5 has associated an object communication and control module (VM), and said pre-determined area (A) to be monitored has associated an area access system (AM) that comprises interaction modules (B1, B2, BM) placed at fixed points (RP, DP) in said predetermined area 10 (A), said system further comprising a control center (CC), said control center (CC) and said object communication and control module (VM) being suitably equipped for establishing a wireless communication link (LT),

15 characterized in that

15 said interaction modules (B1, B2, BM) and said object communication and control module (VM) are configured for mutually establishing a short range communication link (BT) and performing an 20 identification operation through a mutual interaction between said moving object (V, VM) and the area access system (AM), said object communication and control module (VM) being further configured for establishing a long range wireless communication link (LT) with said 25 control center (CC).

16. The system of claim 15, where said area access system (AM) is configured for sending a control center address information (TCC_ID, TAT) to said object communication and control module (VM).

30 17. The system of claim 15, where said object communication and control module (VM) is configured for sending a moving object information (VID, VAF) to said area access system (AM).

35 18. The system of claim 16, characterized in that:
- said area access system (AM) is further

configured for sending an identification request message (M1) to the moving object, said identification request message (M1) comprising said control center address information (TCC_ID, TAT);

5 - said object communication and control module (VM) is further configured for sending an identification response message (M2) to the area access system (AM), said identification response message (M2) comprising moving object information (VID).

10 19. The system of claim 18, characterized in that:
- said object communication and control module (VM) is configured for sending a registration request message (M4) to the control center (CC), said registration request message (M4) comprising said 15 moving object information (VID);

- said control center (CC) is configured for sending a registration response message (M5) to the object communication and control module (VM), said registration response message (M5) comprising an 20 acceptance information (access_denied_flag).

20. The system of claim 15, characterized in that said object communication and control module (VM) is configured for storing and managing a moving object status parameter (VAF), which value indicates the 25 moving object (V, VM) position with respect to said predetermined area (A) to be monitored.

21. The system of claim 15, characterized in that the area access system (AM) comprises a further communication network (PRN) for sending a moving object 30 parameters message (M3) to the control center (CC), after performing said mutual identification operation.

22. The system of claim 19, characterized in that said object communication and control module (VM) is configured for including a moving object phone number 35 in said registration request message (M4).

23. The system of claim 19, characterized in that said control center (CC) is configured for including in said registration response message (M5) a control center phone number and/or map information and/or 5 prognostic feature data.

24. The system of claim 15, characterized in that the moving object (V) comprises an object network (VN) for exchanging messages (M6) between an object user (D) and said object communication and control module (VM) .

10 25. The system of claim 15, characterized in that said interaction modules (B1, B2, BM, PRN) comprise an exit interaction module (B2) placed at an exit point (DP) and suitably equipped for performing a further mutual interaction over said wireless short range communication 15 link (BT) with said object communication and control module (VM) , said object communication and control module (VM) being configured for performing a de-registration operation on said long-range communication link (LT) with said control center (CC) after the completion of said 20 mutual interaction operation, and interrupting (GP1) said long-range communication link (LT) .

26. The system of claim 15, characterized in that said interaction modules (B1, B2) are access barriers and said fixed points (RP, DP) are placed substantially 25 at the boundaries of said predetermined area (A) .

27. The system of claim 25 characterized in that said access barriers are configured also for automatic toll collection.

28. The system of claim 15, characterized in that 30 said predetermined area (A) encompasses a tunnel (T) and in that said access barriers (B1, B2) are placed at a distance (d) from the tunnel boundaries sufficient to ensure that the moving object (V) is registered and monitored before entering said tunnel (T) .

35 29. The system of claim 15, characterized in that

said short range communication link (BT) is a Bluetooth link and said interaction modules (B1, B2) and said object communication and control module (VM) are equipped with Bluetooth communication modules (BM).

5 30. The system of claim 29, characterized in that said Bluetooth communication module (BM) establishes said short range communication link (BT) by performing an inquiry procedure.

10 31. The system of claim 15, characterized in that said long range wireless communication link (LT) is at least partly effected via a wireless mobile network (MN) and said control center (CC) and said object communication and control module (VM) are configured for accessing said wireless mobile network (MN).

15 32. The system of claim 15, characterized in that said wireless mobile network (MN) is a GPRS network.

33. The system of claim 15, characterized in that the moving object (V) is a vehicle.

20 34. The system of claim 15, characterized in that said interaction modules (B1, B2, BM) comprises at least one intermediate barrier (IT, OT) configured for detecting the passage of the moving object (V) and supplying to the control center CC an information about the passage of the moving object.

25 35. The system of claim 34, characterized in that supplying to the control center CC an information about the passage of the moving object is performed over the long range wireless link (LT).

36. A telecommunication network including a system 30 according to any of claims 15 to 35.

37. A computer program product loadable in the memory of at least one computer and comprising software code portions for performing the steps of any of claims 1 to 14.